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NOV 13 2013

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 50-388/2013-003-00
UNIT 2 LICENSE NO. NPF-22
PLA-7103 **Docket No 50-388**

Attached is Licensee Event Report (LER) 50-388/2013-003-00. On September 14, 2013, at approximately 0330 hours, the Susquehanna Steam Electric Station (SSES) Unit 2 reactor was manually scrammed due to loss of the reactor feedwater pumps (RFPs) when reactor water level reached +54 inches while transitioning the feedwater Integrated Control System (ICS) for the 'A' RFP from flow control mode to discharge pressure mode. The Reactor Core Isolation Cooling (RCIC) system was manually initiated for reactor water level control. This LER is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A), for an event or condition that resulted in the manual actuation of the RPS and RCIC system.

There were no actual consequences to the health and safety of the public as a result of these events.

No commitments were identified in this submittal.

J. A. Franke

Attachment: LER 50-388/2013-003-00

Copy: NRC Region I
Mr. J. Greives, NRC Sr. Resident Inspector
Mr. J. Whited, NRC Project Manager
Mr. L. Winker, PA DEP/BRP

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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Susquehanna Steam Electric Station Unit 2	05000388	1 OF 3

4. TITLE

Unit 2 Manual Reactor Scram due to Loss of Reactor Feedwater Pumps

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	14	2013	2013	- 003 -	00	11	13	2013		05000
									FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

Mode 1

10. POWER LEVEL

14%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

Facility Name	Telephone Number (Include Area Code)
Brenda W. O'Rourke, Senior Engineer - Nuclear Regulatory Affairs	(570) 542-1791

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On September 14, 2013, at approximately 0330 hours, the SSES Unit 2 reactor was manually scrammed following the loss of all Reactor Feedwater Pumps (RFPs) due to high reactor water level. This occurred while transitioning the feedwater Integrated Control System (ICS) for the 'A' RFP from flow control mode to discharge pressure mode. Reactor water level rose to +54 inches causing a trip of the reactor feedwater pumps. Operations subsequently took the mode switch to shutdown to manually scram the reactor. All control rods inserted. There were no automatic Emergency Core Cooling System initiations. No steam relief valve opened during the event. No containment isolations occurred. All safety systems operated as expected. The Reactor Core Isolation Cooling (RCIC) system was manually initiated for reactor water level control until a RFP was recovered. RCIC was manually shut down once a RFP was restored. This LER is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A), for an event or condition that resulted in the manual actuation of the RPS and RCIC system.

Root cause of the event: The overall process for implementation of ICS logic block code changes lacked the required level of process rigor and formality for maintaining digital control systems with the potential to affect reactivity and reactor water level. This challenged the operator's ability to maintain precise control of the plant.

Key planned corrective actions: 1) Develop procedural guidance to implement the HURST software configuration management tool for post-maintenance testing of ICS software changes, and 2) Develop procedural guidance for installing/verifying code changes to the ICS software.

There were no actual consequences to the health and safety of the public as a result of this event.

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NARRATIVE

CONDITIONS PRIOR TO THE EVENT

Unit 1 - Mode 1, 100 percent Rated Thermal Power
Unit 2 - Mode 1, 14 percent Rated Thermal Power

EVENT DESCRIPTION

On September 14, 2013, at approximately 0330 hours, Operations was performing a shutdown of Susquehanna Steam Electric Station (SSES) Unit 2 reactor. With the reactor at 14 percent power, the Feedwater Integrated Control System (ICS) in automatic, and the 'B' Reactor Feedwater Pump (RFP) [EIIS Code: SJ] running in standby, the control room operators initiated a transfer of the 'A' RFP from flow control mode (FCM) to discharge pressure mode (DPM). During the transition, the 'A' RFP prematurely entered DPM while the normal discharge valve (HV-20603A) was still open, causing a rapid rise in the reactor pressure vessel (RPV) water level. The operators were unsuccessful in reducing the feedwater flow to the reactor before the water level reached the Level 8 trip setpoint (+54 inches). This resulted in all RFP turbines tripping. The operators subsequently took the mode switch to shutdown to manually scram the reactor.

All control rods inserted. Reactor water level lowered to approximately +18 inches. There were no automatic Emergency Core Cooling System (ECCS) initiations. The Reactor Core Isolation Cooling (RCIC) [EIIS Code: BN] system was manually initiated for reactor water level control until a RFP was recovered. No steam relief valve opened during the event. No containment isolations occurred. All safety systems operated as expected. RCIC was manually shut down once a RFP was restored.

In accordance with 10 CFR 50.72(b)(2)(iv)(B), on September 14, 2013, a 4-hour ENS notification (# 49342) was made to the NRC for an event or condition that results in the actuation of the Reactor Protection System (RPS) when the reactor is critical. This event was also reportable as an 8-hour notification in accordance with 10 CFR 50.72(b)(3)(iv)(A) for any event or condition that resulted in a valid actuation of the RPS and the RCIC system. This LER is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A) for an event or condition that resulted in the manual actuation of the RPS and RCIC system.

CAUSE OF THE EVENT

Direct Cause – A critical function block in the ICS software was configured incorrectly (i.e., data input error) during software modifications to the Unit 2 Integrated Control System.

Root cause of the event: The overall process for implementation of ICS logic block code changes lacked the required level of process rigor and formality for maintaining digital control systems with the potential to affect reactivity and reactor water level. This challenged the operator's ability to maintain precise control of the plant.

ANALYSIS / SAFETY SIGNIFICANCE

Actual Consequences

The actual consequence of this event was a reactor scram from 14 percent reactor power during a planned shutdown. There was no nuclear safety, radiological safety, environmental safety, or industrial safety consequences.

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Potential Consequences

The Unit 2 risk significance and potential consequences for the initiating event experienced on September 14, 2013 due to a loss of feedwater was less than 1E-06 for Core Damage Probability (CDP) and 1E-07 for Large Early Release Probability (LERP) significance thresholds as outlined in NRC Inspection Manual Chapter 609. These thresholds represent a Green significance level and are of "Very Low Safety Significance."

In summary, there were no actual consequences to the health and safety of the public as a result of the event.

CORRECTIVE ACTIONS

Key Completed Corrective Actions:

- Reviewed software changes made from August 2011 thru September 17, 2013 to the Unit 1 and Unit 2 12 ICS field processors. No coding errors were identified.

Key Planned Corrective Actions:

- Review software changes made to the 12 ICS field control processors prior to August 2011 to verify there are no coding errors.
- Review software modifications made to all other plant systems with digital controls. Ensure proper installation of software via system testing, system operation, line-by-line comparisons, or other methods approved by system engineering management.
- Develop procedural guidance to implement the HURST software configuration management tool for post-maintenance testing of ICS software changes.
- Develop procedural guidance for installing/verifying code changes to the ICS software.
- Review existing task qualifications for the Station Engineering – Computer group and identify any necessary changes based on the current work activities performed by the group.

PREVIOUS SIMILAR EVENTS

LER 388/2012-004-00: Unit 2 Auto Scram on Low RPV Level

LER 388/2012-002-00: Unit 2 Manual Scram Due to Loss of the Integrated Control System

LER 388/2011-003-00: Unit 2 Scram during Performance of ICS Testing

LER 388/2010-002-00: Automatic Reactor Scrams Occur during Post-Modification Testing of the Digital Feedwater Integrated Control System